# Toxic Industrial Chemicals (TICs) and Toxic Industrial Materials (TIMs)

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### Purpose

To inform the Army's future Chemical Officers about TICs and TIMs and provide the necessary tools to execute the war time mission in this environment.



# Terminal Learning Objective

Task: TICs and TIMs on the battlefield

Conditions: Given the classroom environment

Standards: Understand definitions, effects, resources, and actions to take for TICs and TIMs

# Enabling Learning Objectives

(1 of 2)

- ELO 1- Definitions
  - TIC
  - TIM
- ELO 2- IPB
  - AO Infrastructure
- ELO 3- Key Indicators
- ELO 4- Common Effects

# Enabling Learning Objectives

(2 of 2)

- ELO 5- Mask Limitations
- ELO 6- Detectors
- ELO 7- Immediate Action
- ELO 8- Resources Available



Task: Definitions

Conditions: Given the classroom environment

 Standards: Understand definitions of TICs and TIMs

### Toxic Industrial Chemicals

ITF-25 defines a TIC as a material produced in quantities of greater than 30 tons in a single facility and has a toxicity (LCt 50 inhalation) of less than 100,000 Mg per min/M3 and an appreciable (undefined) vapor pressure at 20C.

# Toxic Industrial Chemicals

Any chemical substance that can render troops ineffective under normal MOPP conditions. Primarily an inhalation hazard but troops can receive a dosage through ingestion or absorption of the skin.



#### Toxic Industrial Materials

Any substance that in a given quantity produces a toxic effect in exposed personnel through inhalation, ingestion, or absorption.



# Examples of TICs and TIMs

- Fuels
- Oil
- Pesticides
- Acids and Bases
- Radiation
   Sources
- Fertilizers

- Arsenic
- Cyanide
- Metals

   (Mercury &
   Thallium)
- Phosgene

### TICs/TIMs vs. CW Agents

#### TICs/TIMS

- Inhalation Hazard
- Ingestion Hazard
- Skin Contact Hazard
- Inexpensive
- May defeat masks
- Detection is Limited
- Chronic and/or Acute effects

#### **CW Agents**

- Inhalation Hazard
- Ingestion Hazard
- Skin Contact Hazard
- Known Threat
- Designed to create
   Casualties
- Primarily acute effects



 Task: Intelligence Preparation of the Battlefield (IPB)

Conditions: Given the classroom environment

 Standards: Integrate TICS and TIMS into the IPB process and give accurate advice to the commanders in regards to hazards

#### Why is IPB Important?

- It saves lives.
- It saves time.
- Gives the commander a clear picture of battlefield.



Why use industrial chemicals as WMDs?

- Accessible
- Volume offsets lower toxicity
- Multiple hazards
- Easier to steal industrial chemicals than to make military agents
- Security & binary storage of military agents discourages theft



- Area of Operations Research
  - Economics (Infrastructure)
  - Factories, Textiles, and Chemical Plants
- Consider Chemicals with Acute Inhalation Effects (i.e., Carbon Disulfide and Chlorine)
- Consider Materials with Chronic Effects (i.e.. Some Pesticides and Radiation Sources)

- Vulnerability Analysis
  - How susceptible is your unit to exposure?
  - Is your unit prepared for potential exposure?
- Contamination Avoidance
  - R & S Plan (NAIs)
  - Clean and Dirty Routes



- Evaluate the Threat
  - Does the threat have the capability?
  - Does the threat have a delivery means?
  - What is the likely hood of use?
  - Economy (low or high budget)
- Conduct Risk Assessment (Record)



Task: Key indicators

• Conditions: Given the classroom environment

 Standards: Identify sources and potential sources of TICs and TIMs within your AO

# **Key Indicators**

- Intelligence (S2)
  - INTSUMS
  - Reconnaissance Reports
- Local Population and Government Actions
- Sudden Force Degradation
  - Battalion Aid Station Reports
  - Unit Spot Reports



# Key Indicators

- TICs and TIMs Characteristics
  - Strong Odor
    - Pungent
    - Sweet
  - Color
    - Green
    - Yellow
    - Haze/Cloudy
    - Red



Task: Common effects on soldiers

• Conditions: Given the classroom environment

 Standards: Identify common effects and dangers which can occur from exposure

#### Common Effects

- Acute Effects
  - Moderate to Extreme Headaches
  - Nausea
  - Respiratory Failure
  - "Dry Land Drowning"
  - Oxygen Displacement
  - Temporary or Instant Blindness



#### Common Effects

- Chronic Effects
  - Tumors (Malignant or Benign)
  - Blood Poisoning
  - Respiratory Inhibition
  - Leukemia
  - Sterility
  - Permanent Blindness



Task: Mask Limitations

• Conditions: Given the classroom environment

• Standards: Understand that the common M40 protective mask does not protect against certain TICS and TIMS

#### **Mask Limitations**

• BLUF- M40 Series Mask provide poor to medium protection against TICs/TIMs

 Reference; Toxic Industrial Chemicals Assessments of NBC Filter Performance, Edgewood Chemical Biological Center

#### **Mask Limitations**

- Filter Performance Measured by:
  - Effective- Saturation Pressure is less than 10 mm Hg at 25 C
  - Marginal- Saturation Pressure from 10 to 100 mm Hg at 25 C
  - Poor- Saturation Pressure above 100 mm Hg at 25 C



#### **Mask Limitations**

Some chemicals decompose
 Carbon faster than others

• Chemicals with a Molecular Weight of < 29 will pass through filter



Task: Detectors available

Conditions: Given the classroom environment

 Standards: Know detectors available and their limitations

#### **Detectors**

- Limited research has been done
- M93A1 FOX
  - Limited can have the Enviro Chip uploaded
  - M21 will not detect.
- M22 ACADA
  - Will not detect
- ICAM/CAM
  - Will not detect

• Task: Immediate action

• Conditions: Given the classroom environment

• Standards: Be aware of surroundings and be prepared to advise the commander when the situation arises

#### Immediate Action

- Research (IPB)
  - Know What To Look For
- Collect Information
  - Spot Reports
  - BN Aid Station
- Assess the Situation
  - ID Problem
  - Tentative Plan



#### Immediate Action

- Consult Resources and Unit SOP
- Consult Risk Assessment
  - Advise the Commander; ask for Guidance
- Implement Commander's Guidance
  - Assume MOPP4
  - Tend To Any Casualties
  - Move out of the Hazard Area
  - Prepare for Follow-On Mission



#### Immediate Action

- Mark the Area (If Applicable or Practical)
  - Unit SOP
  - Eight Digit Grid
- Report to your Higher Command



• Task: Resources available

• Conditions: Given the classroom environment

• Standards: Understand which resources are available to assist in identification and immediate action procedures



#### Resources Available

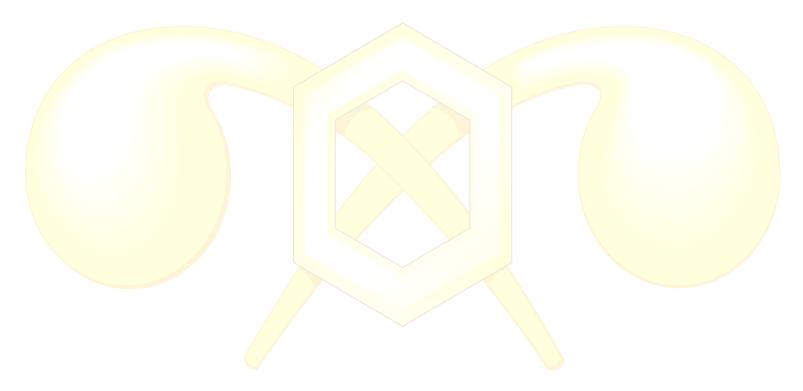
- ITF-25 (International Task Force 25, Hazards from Toxic Industrial Chemicals, April 1998)
- 2000 North American Emergency Response Handbook
- NIOSH Pocket Guide



#### Resources Available

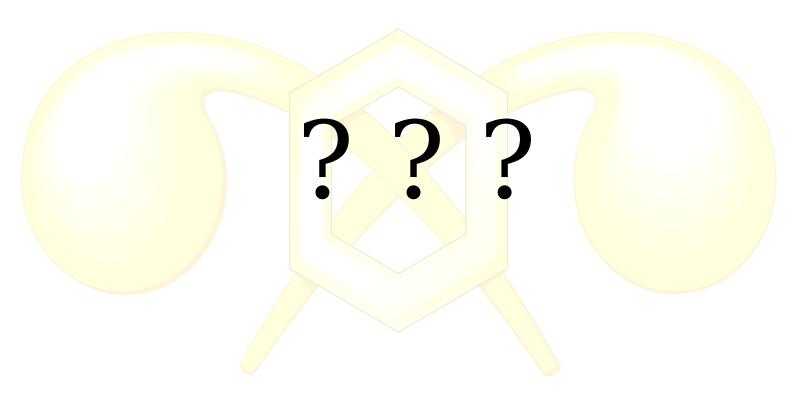
- JWARN (will contain a database for common chemicals)
- MSDS
- TG 230 A Exposure Levels
- Toxic Industrial Chemicals
   Assessment of NBC Filter
   Performance- Edgewood Chemical
   Biological Center

# Summary





# Questions





# Conclusion

